AP CALCULUS
SUMMER ASSIGNMENT Name:

Read the following sections from Calculus 5th Edition by Larson, Hostetler, Edwards, and complete the assigned problems from each section.

1. Read "What is Calculus?" pg. XXXV-XXXVii
2. Read the following pages from the Prerequisite section

    a. Section 1 – pg 1-7 Do pg. 8-9, # 1-10, 16, 21, 30,56, 73-78
    b. Section 2 – pg. 10-14 Do pg. 15 # 27-30
    c. Section 3 - pg. 17-22 Do pg. 23 #1-6
    d. Section 4 – pg. 25-30 Do pg. 31 #9,23,27,32,35
    e. Section 5 - pg. 34-41 Do pg.42-43 #13, 15, 19, 39
    f. Section 6 – pg. 45-52 Do pg. 54 #17, 18, 19, 23,24
    g. Attached work sheets

Bring the textbook to school the first week of school.

You will need a 3-ring binder, at least 1.5 inches for this class. No spiral notebooks are allowed.

Enjoy your summer.
Ms. De Lia

AP Calculus AB
Chapter :

Name: ____________________

1. (No Calculator) Evaluate each limit or explain why the limit does not exist.

a) $\lim\limits_{x\to 5} \operatorname{int}(x)$

b) $\lim\limits_{x\to\infty} \dfrac{x^2+5x-3}{3x+2}$

c) $\lim\limits_{x\to\infty} \dfrac{x^2+5x-3}{3x^2+2}$

d) $\lim\limits_{x\to -2} \left(x^3-2x^2+1\right)$

e) $\lim\limits_{x\to\infty} \dfrac{x^2+5x-3}{3x^3+2}$

f) $\lim\limits_{x\to 0} \dfrac{x}{\sin(2x)}$

g) $\lim\limits_{x\to\infty} \dfrac{\sin x}{2x}$

h) $\lim\limits_{x\to 0} \dfrac{\tan(5x)}{\sin(3x)}$

i) $\lim\limits_{x\to 0} e^x \sin x$

j) $\lim\limits_{x\to 1} \dfrac{4x^2+5x}{x-3}$

k) $\lim\limits_{x\to 3/2} \operatorname{int}(2x-1)$

l) $\lim\limits_{x\to\infty} \dfrac{5x-7x^2}{4x^2+1}$

m) $\lim\limits_{x\to -3} \dfrac{|x+3|}{x+3}$

n) $\lim\limits_{x\to\infty} \dfrac{x^4+x^3}{12x^3+128}$

o) $\lim\limits_{x\to 4} \sqrt{1-2x}$

p) $\lim\limits_{x\to 0} \dfrac{\frac{1}{x+5}-\frac{1}{5}}{x}$

q) $\lim\limits_{x\to 9} \dfrac{\sqrt{x}-3}{x-9}$

r) $\lim\limits_{x\to 2} \dfrac{x^2-x-2}{x^2+x-6}$

2. (Calculator) Use a table of values to evaluate the following limit: $\lim\limits_{x\to\infty} \left(1+\dfrac{1}{x}\right)^x$

Recognize the number? … <u>Add this to your notecards</u> under "Limits you should know". … yeah … those things you have to hand in before your test! ☺

3. (Calculator) Make a table of values (4 of them would work) to evaluate $\lim\limits_{x\to 2^+} \dfrac{x+3}{x-2}$.

4. (No Calculator) Suppose $\lim_{x\to c} f(x)$ and $\lim_{x\to c} g(x)$ exist, and

$$\lim_{x\to c}[f(x)+g(x)]=2$$
$$\lim_{x\to c}[f(x)-g(x)]=1$$

Find $\lim_{x\to c} f(x)$ and $\lim_{x\to c} g(x)$.

5. (No Calculator) Find all asymptotes for each function and justify your response.

a) $y=\ln x$

b) $f(x)=\dfrac{(x+2)(x-3)}{(x+2)(x-1)}$

c) $f(x)=\dfrac{x-1}{x^2(x+2)}$

d) $f(x)=\dfrac{x^3-3x^2+x-1}{x^2+x-2}$

6. (No Calculator) Let $y=\dfrac{x^2+5x-3}{x-2}$.

a) Find the End Behavior Model

b) Describe the End Behavior using limits.

c) Find all asymptotes.

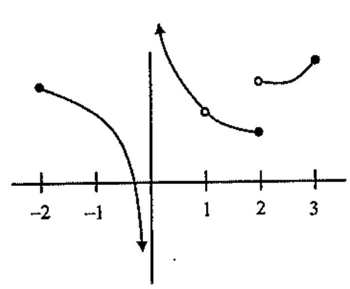
7. The number of bears in a federal wildlife reserve is given by the population $p(t)=\dfrac{200}{1+7e^{-0.1t}}$, where t is in years.

a) Find p (0) and give a possible interpretation of this number.

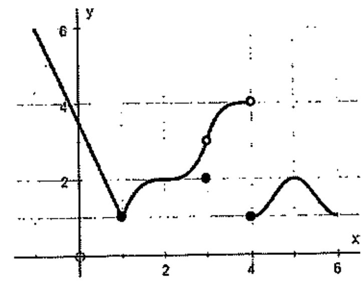
b) Find $\lim_{t\to\infty} p(t)$ and give a possible interpretation of this number.

8. Let $h(x)=\dfrac{(x-1)(x+3)}{(x+3)(x-2)}$. Identify all values of c where the $\lim_{x\to c} h(x)$ EXISTS.

9. The function shown to the right is defined on [–2, 3]. For what values of c, does $\lim_{x\to c} f(x)$ exist?



For questions 10 - 13, use the function shown to the right. The domain is [–1, 6].



10. Evaluate each of the following limits. If they do not exist, explain why.

a) $\lim_{x\to 1} f(x)$

b) $\lim_{x\to 3^-} f(x)$

c) $\lim_{x\to 3^+} f(x)$

d) $\lim_{x\to 3} f(x)$

e) $\lim_{x\to 4^+} f(x)$

f) $\lim_{x\to 4^-} f(x)$

g) $\lim_{x\to 4} f(x)$

h) $\lim_{x\to 0} f(x)$

11. For what values of x is the function continuous?

12. For what values of x is the function not continuous?

13. Are any of the values you used to answer question 11 removable? If so, describe how you would make the function continuous at that point?

14. Let $f(x)=\begin{cases} 2 & \text{if } x\le -1 \\ -x+1 & \text{if } -1<x<0 \\ 2 & \text{if } x=0 \\ -x+1 & \text{if } 0<x<1 \\ 2 & \text{if } x\ge 1 \end{cases}$

a) Find the right-hand and left-hand limits of f at $x=-1$, 0, and 1.

b) Does f have a limit as x approaches -1? 0? 1? If so, what is it? If not, why not?

c) Is f continuous at $x=-1$? 0? 1? Explain.

Compute the derivatives of the following functions.

$(1) f(x) = x^2 - 2$	$(2) f(x) = x - x^3$	$(3) f(x) = x^2 + 3x - 6$
$(4) f(x) = 2x^2 - 4$	$(5) f(x) = \frac{2}{x}$	$(6) f(x) = \frac{4}{x^2} - \frac{x^2}{4}$
$(7) f(x) = 2x^{10} - 4x^2$	$(8) f(x) = 3\sqrt{x}$	$(9) f(x) = x\sqrt{3}$
$(10) f(x) = \frac{x^4}{4} + x - 2$	$(11) f(x) = x(x+1)$	$(12) f(x) = x^2 - e^2$
$(13) f(x) = 5x^3 - \frac{5}{x^3}$	$(14) f(x) = (6x+5) - (3x+x^2)$	$(15) f(x) = 2x^2 - 5x + 10$
$(16) f(x) = x - \frac{1}{x}$	$(17) f(x) = 4x^{\frac{5}{2}}$	$(18) f(x) = 1 - 5$
$(19) f(x) = \frac{1}{3x}$	$(20) f(x) = \frac{x^2}{2} - 3x$	$(21) f(x) = 5^2$
$(22) f(x) = (x^2+1)^2$	$(23) f(x) = x^{1000}$	$(24) f(x) = \frac{1}{x^{1000}}$
$(25) \cancel{f(x) =} \frac{x^2}{\ln(2)}$	$(26) f(x) = \sqrt{3x}$	$(27) f(x) = \sqrt{7}$
$(28) f(x) = \frac{x^2-1}{x}$	$(29) f(x) = \frac{8}{\sqrt{x}} - 3x$	$(30) f(x) = \frac{7x+3x^2}{5\sqrt{x}}$

Calculus Concepts

Name:

Product/Quotient Rule Worksheet

Date:

Product Rule: $\frac{d}{dx}(f(x)g(x)) = f(x)g'(x) + g(x)f'(x)$

Quotient Rule: $\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) = \frac{g(x)f'(x) - f(x)g'(x)}{(g(x))^2}$, where $g(x) \neq 0$

Directions: Find the derivative of each problem using either the product or the quotient rule. Show all calculus and algebra necessary to arrive at your answer. **NO CALCULATORS.**

A. Find $h'(x)$ if $h(x) = (3x - 2x^2)(5 + 4x)$

B. Find $g'(x)$ if $g(x) = x\sin x$

C. Find $\frac{d}{dx}(f(x))$ if $f(x) = \frac{1}{3}\left(2x^3 - 4\right)$

D. Find $f'(x)$ if $f(x) = \frac{5x-2}{x^2+1}$

E. Find $g'(x)$ if $g(x) = \dfrac{3 - \frac{1}{x}}{x+5}$

F. Find $h'(x)$ if $h(x) = \dfrac{1 - \cos}{\sin x}$

Find the derivative of each of the following functions using the product or quotient rule. Show all necessary calculus and algebra used to arrive at your answer.

1. $f(x) = (x^2 - 2x + 1)(x^3 - 1)$

2. $f(x) = \dfrac{x+1}{x-1}$

3. $f(x) = x^2 \cos x$

4. $f(x) = \sin x \cos x$

5. $f(x) = \dfrac{x+1}{\sqrt{x}}$

6. $f(x) = \dfrac{2x+3}{6}$

7. $f(x) = (x^3 - 3x)(2x^2 + 3x + 5)$

8. $f(x) = \dfrac{\sin x}{\cos x}$

Calculus Worksheet
Chain Rule Practice

Find the derivative of each of the following functions.

1. $y=\sqrt{x^2-7x}$

2. $y=\tan\left(x^2\right)+\tan^2 x$

3. $y=\dfrac{1}{\left(x^2-2x-5\right)^4}$

4. $y=\cos(\tan x)$

5. $f(x)=\left(x-\dfrac{1}{x}\right)^{\frac{3}{2}}$

6. $y=\sin^3 x+\cos^3 x$

7. $y=\left(\dfrac{x-6}{x+7}\right)^3$

8. $y=\sin^2(\cos(4x))$

9. $y=\dfrac{1}{\sqrt[5]{2x-1}}$

10. $y=\dfrac{\sin^2 x}{\cos x}$

11. $y=\sin^3(2x+3)$

Calculus Worksheet
Chain Rule Practice

Find the derivative of each of the following functions.

1. $y = (x^2 + 4x + 6)^5$

2. $y = \tan 3x$

3. $f(x) = (x^3 - 5x)^4$

4. $y = 4\sec 5x$

5. $f(x) = (3x - 2)^{10}(5x^2 - x + 1)^{12}$

6. $y = \cos(x^3)$

7. $f(x) = (6x^2 + 5)^3(x^3 - 7)^4$

8. $y = \cos^3 x$

9. $y = (2x^2 - 6x + 1)^{-8}$

10. $f(x) = (1 + \cos^2 x)^6$